



New Materials Development Using Biotechnology Processes

Overview:

Biotechnology processes and methods can be used to develop new materials with the desired characteristics. A Langmuir - Blodgett apparatus is used to make thin-films having photo-electronic properties. Enzymes are used to synthesize and modify new materials. The ability to tailor functionality to desired outcome and the use of environmentally friendly processes makes these advantageous approaches to new materials development.

Description:

Applications for the new materials include:

- Optical Devices: Integrating light-responsive proteins
- Laser Eye Protection: Integrating NLO and optical dyes
- Selectively Permeable Membranes: Integrating signal responsive pore-forming proteins and/or specific bioreceptors
- Food Assessment: Quality, Odor, Taste and/or Shelf-life
- Polymer-based rechargeable batteries
- Fire Resistant/Flame Resistant Materials
- Edible and biodegradable food packaging
- Detergents, Emulsifiers and Compatibilizers
- Electromagnetic Shielding

Status:

Methodologies for the immobilization of various bioreceptors (PE, AP, HRP, Gox) into conducting electroactive polymers were developed. Biosensing versatility with various enzyme systems for the detection of glucose, hydrogen peroxide, and organophosphorus pesticides was demonstrated. There was also considerable development of fast response times and sensitivities (on the order of mM), the use of simple and chemically mild techniques, and the engineering of mechanically robust, stable and reusable systems. 30 journal publications and 1 book chapter have been published; 2 patents were issued and 1 filed in November 1995, and 15 presentations have been made at meetings/conferences.

Collaborative research partnerships were formed with the University of Massachusetts, Lowell; Intelligent Polymer Research Laboratory (IRPL); the University of Wollongong, Wollongong, Australia; the University of California, Berkeley; Worcester Institute for Experimental Biology; and Dartmouth College.

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